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BOOK REVIEW

E. Gileadi: Physical electrochemistry

Wiley–VCH, Weinheim, 2011, XX + 373 pp, 60.00 €; ISBN: 978-3-527-31970-1

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The recently observable renaissance of electrochemistry is, at least in part, caused by the need for large-scale energy storage and conversion devices associated with the growing utilization of renewable energy sources (e.g. wind, solar energy). It needs practitioners—well-educated scientists equipped with sound knowledge not just of lithium-ion batteries, but of electrochemistry in total. Consequently, a growing demand for textbooks is expected. There are several well-established ones, but some of them are simply dated and without hope of update, some of them are far too specific or too all-encompassing just too thick. A new book, not just a rehashed version of a previous version, written by a champion of the subject familiar both with research and teaching is highly welcome. The book by Gileadi reviewed here is exactly what will be needed. The small sticker on the front page "Master" clearly indicates the intention of both author and publisher: This book is offered as a supplement for teaching in electrochemistry at the master level, and perhaps even at the bachelor level in those places, where electrochemistry at the bachelor course level is not just a footnote in thermodynamics and inorganic chemistry. The broad selection of subjects dealt with in 20 chapters of wildly varying size is much more than may be covered within one semester. Whether it is a representative and useful choice will now be examined.

An initial question: why this specifically sounding title? is presumably addressed in the preface. Surprisingly interfacial electrochemistry[1] is named as the book's subject, and this seems to be the more precise title. Nowhere in the book is electrochemistry of electrolyte solutions treated, Debye and Hückel are not even mentioned, Ostwalds dilution law, as well as Kohlrausch square root law, are missing. A textbook aimed at the specified readership is incomplete without this rather important part of physical electrochemistry. The hope, that thermodynamics as well as transport properties of electrolyte solutions will be treated adequately in bachelor courses may turn out to be too optimistic. In any case and assuming that ionic conductivity and a dissociation constant are either too simple or well known and unimportant in any case—understanding the internal resistance of a galvanic cell under load or the need for adding graphite to the active mass in a lithium ion battery is hardly possible without knowing at least the basics of electrolytes.

The relationship to the earlier textbook of Gileadi becomes obvious in many places: Electroplating of aluminum has apparently moved beyond the solvent-electrolyte combinations mentioned in the book on p. 309. Somehow, ionic liquids must have escaped the authors attention. Instead, kinetics and mechanisms of metal deposition—physical and interfacial electrochemistry indeed feature prominently a few pages later. This is certainly valuable but in the present context of a textbook rather arbitrary.

Any textbook of a reasonable size will necessarily be incomplete; no textbook can cover every conceivable

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[1] Perhaps this is not a big surprise after all: The book E. Gileadi, E. Kirowa-Eisner, and J. Penciner: Interfacial Electrochemistry, Addison Wesley, London 1975, may be considered as a forerunner. Somehow, this background may have provided more guidance than admitted. There is a second argument: There is the book: W. Schmickler and E. Santos: Interfacial Electrochemistry, 2nd edn, Springer-Verlag, Berlin 2010. Apparently, authors of scientific books tend not to waste much time on selecting suitable titles for their books.

subject in depth with equal intensity. Not surprisingly, omissions may result from personal tastes and the experience of the author. Nevertheless, a subject such as ionic liquids should at least be mentioned, even though the author is certainly entitled to assume, that the bright future promised for these compounds may be less brilliant than sometimes claimed.

Experimental methods are frequently omitted in textbooks, sometimes an arbitrary selection (most likely from the authors lab) is covered. In this book a very traditional selection is covered for reasons unknown in three rather strangely labeled chapters. Non-traditional methods have somehow escaped the author, and just these methods have turned out to be particularly helpful in interfacial electrochemistry. The single exemption from tradition is the quartz crystal microbalance—and, because it is an exemption, a whole chapter (of just ten pages) is devoted to it. Upon closer inspection, the strange chapter titles may have some meaning: The first chapter (without a number in the title) is a collection of everything traditional, except linear potential sweep and impedance methods, and the chapters with number 2 and 3 in the title cover exactly these methods.

The book covers many topics of current electrochemistry but the list of omissions goes beyond the mentioned examples: Sensors of any kind are not even mentioned; solid electrolytes do not feature, electroorganic synthesis hardly makes it beyond an entry in the registry.

A reader interested in a book well-written and easy to read willing to use this book as a supplement to an electrochemistry textbook covering the whole area will find a valuable addition to his library. The master student expecting a true textbook will make a disappointing discovery when realizing the many gaps. A complete version of this book may eventually be welcome.